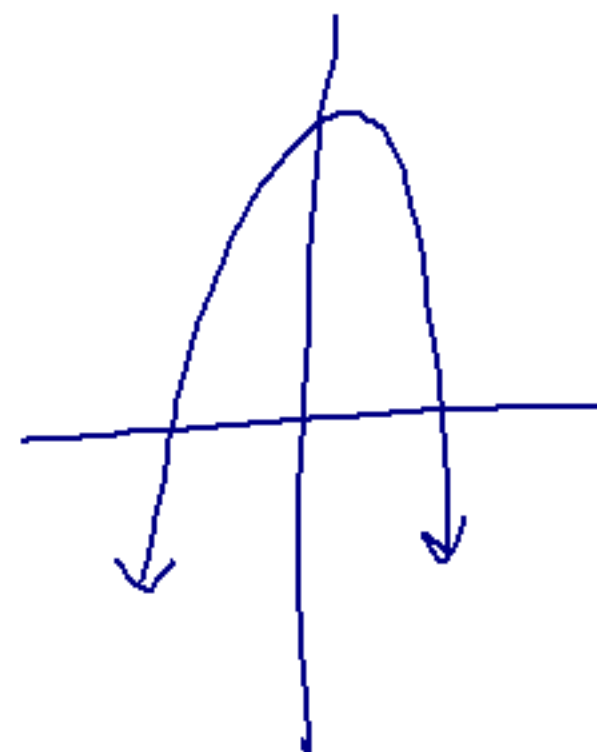
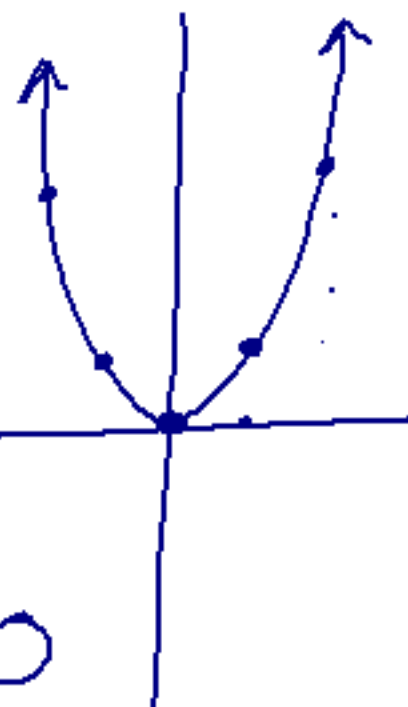


Parabolas

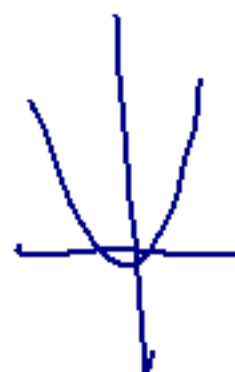
$$y = ax^2 + bx + c$$
$$y = 2x^2 + 0x + 0$$




opening up = $a = +$

open down = $a = -$

$$y = x^2 + 2x + 1$$



① up 

② $y = 3 - x - \frac{1}{2}x^2$
down 

③ down

$y = -3x^2 \dots$

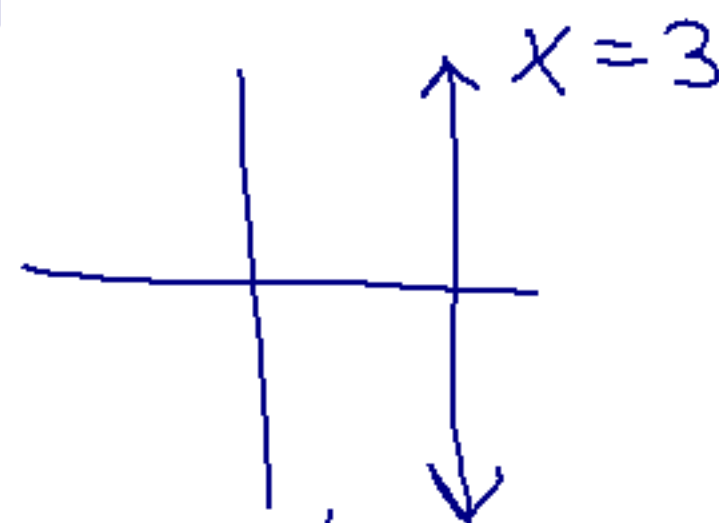
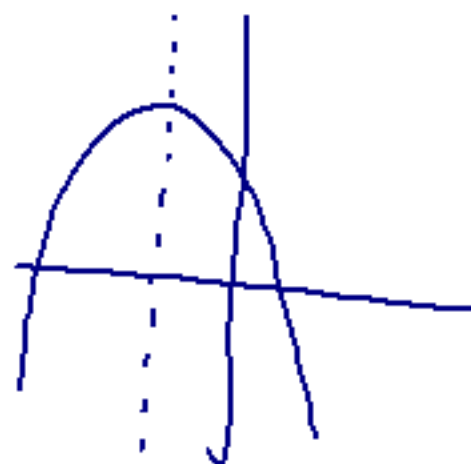
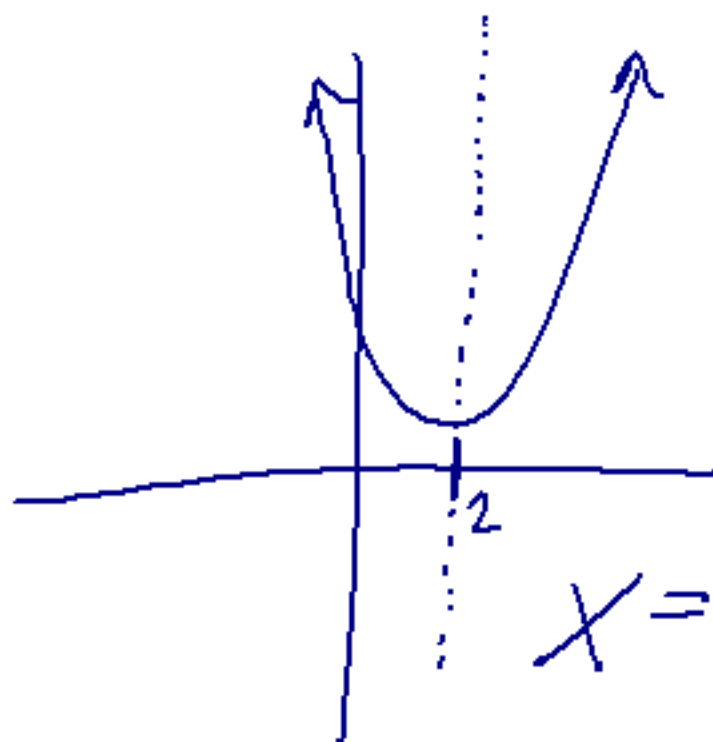
④ $y = 4(-3x^2)$
down

⑤ up

⑥ $y = 8x^2 - 3x + 2$
up

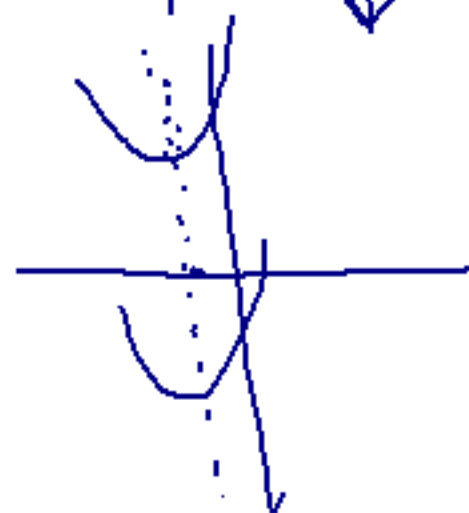
$$x = -\frac{b}{2a}$$

$$y = ax^2 + bx + c$$



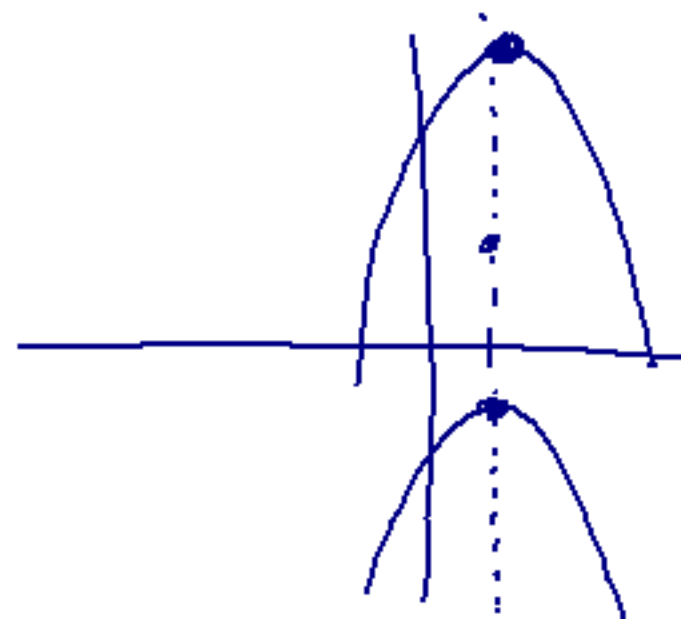
⑦ $y = 2x^2 + 4x - 1$

$$x = \frac{-b}{2a} = \frac{-4}{4} = -1$$



$$\textcircled{8} y = -x^2 + 2x + 5$$

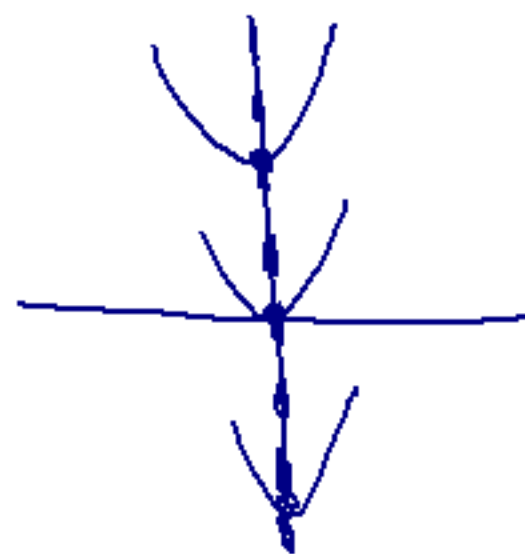
$$x = \frac{-b}{2a} = \frac{-2}{-2} = 1$$



$$\textcircled{9} y = 3x^2 - 5$$

$$y = 3x^2 + 0x - 5$$

$$x = \frac{-b}{2a} = \frac{0}{6} = 0$$



$$\textcircled{10} y = x^2 + 2x - 1$$

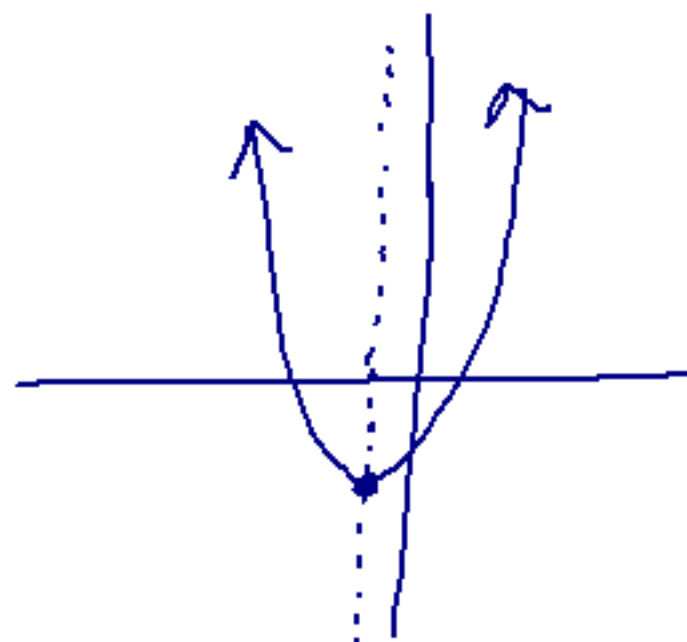
$$x = \frac{-b}{2a} = \frac{-2}{2} = -1$$

$$y = (-1)^2 + 2(-1) - 1$$

$$y = 1 + -2 - 1 =$$

$$y = -2$$

$$(-1, -2)$$



$$\textcircled{11} \quad y = -x^2 + 4$$

$$y = -x^2 + 0x + 4$$

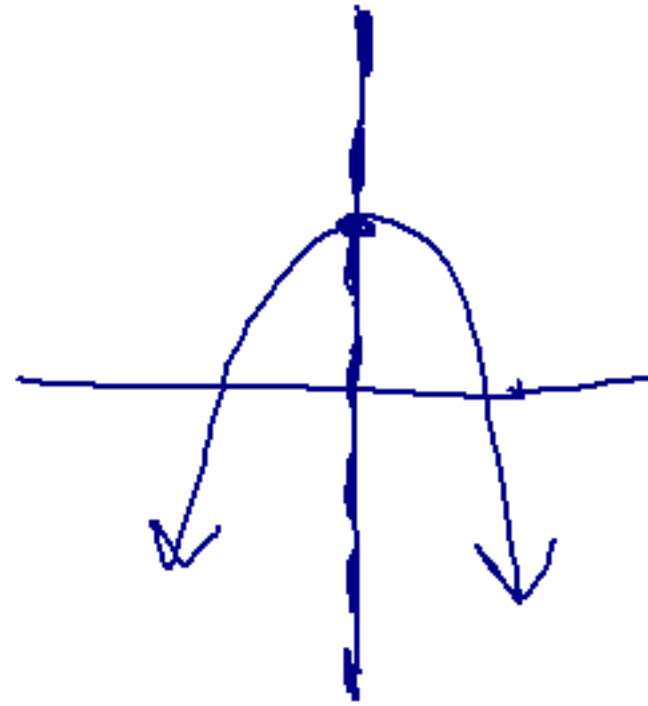
$$x = \frac{-b}{2a} = \frac{0}{-2} = 0$$

$$y = -(0)^2 + 4$$

$$y = 4$$

$$(0, 4)$$

$$(0, -)$$



$$\textcircled{12} y = 2x^2 + 4x + 0$$

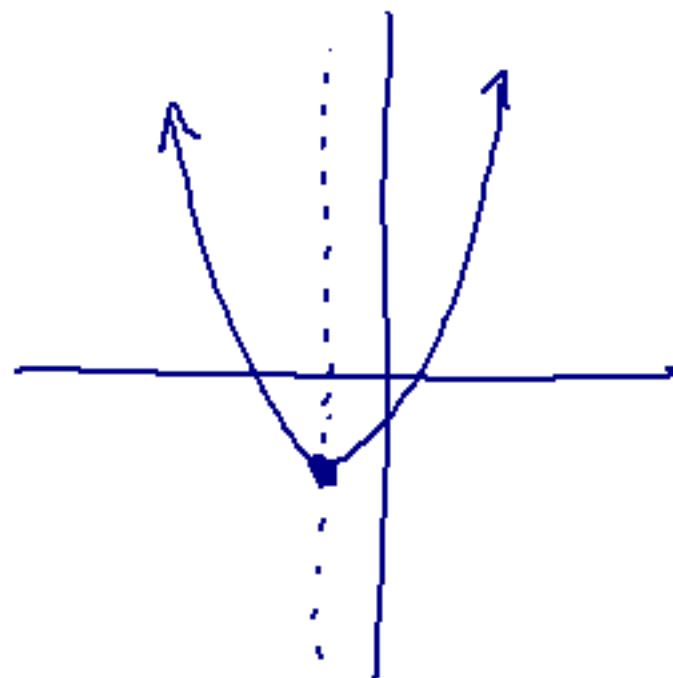
$$x = \frac{-b}{2a} = \frac{-4}{4} = -1$$

$$y = 2(-1)^2 + 4(-1)$$

$$= 2 - 4$$

$$= -2$$

$$(-1, -2)$$



$$(13) y = x^2 - 2x + 3$$

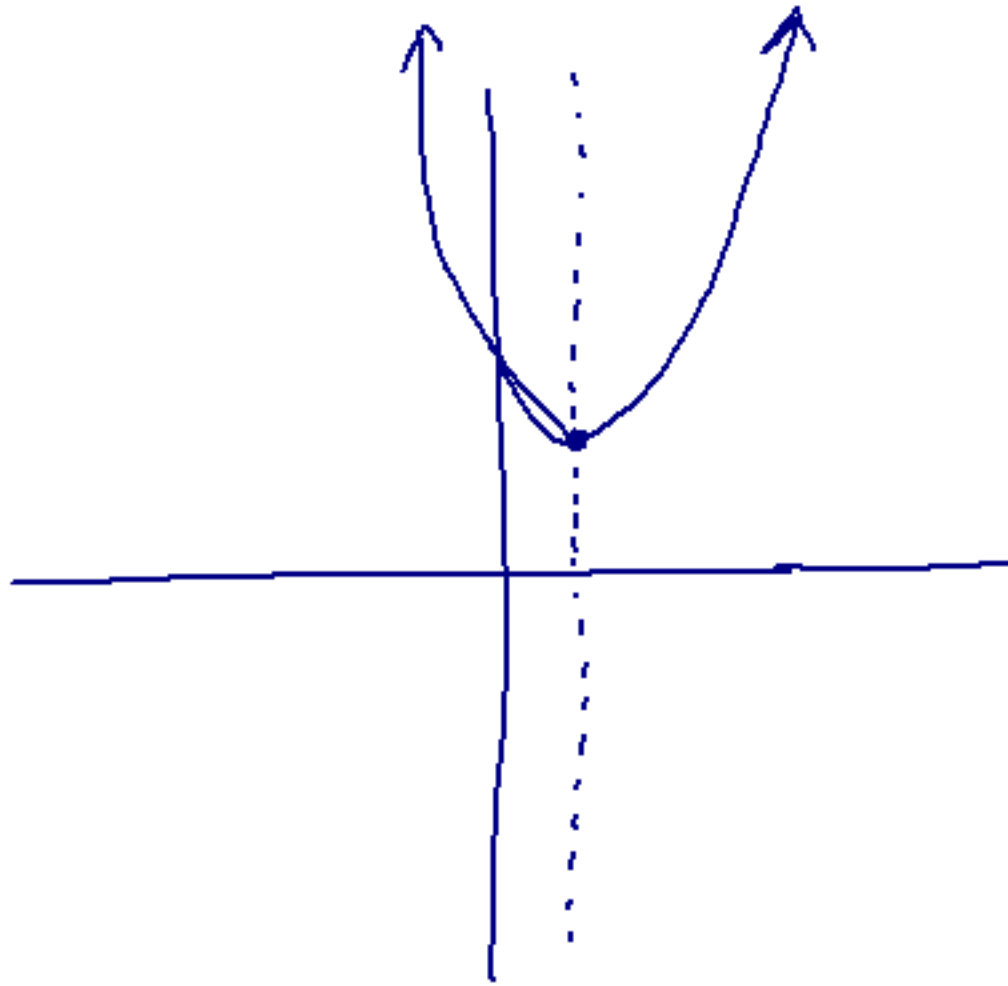
$$x = \frac{-b}{2a} \quad x = \frac{2}{2} = (1)$$

$$y = (1)^2 - 2(1) + 3$$

$$y = 1 - 2 + 3$$

$$y = 2$$

$$(1, 2)$$

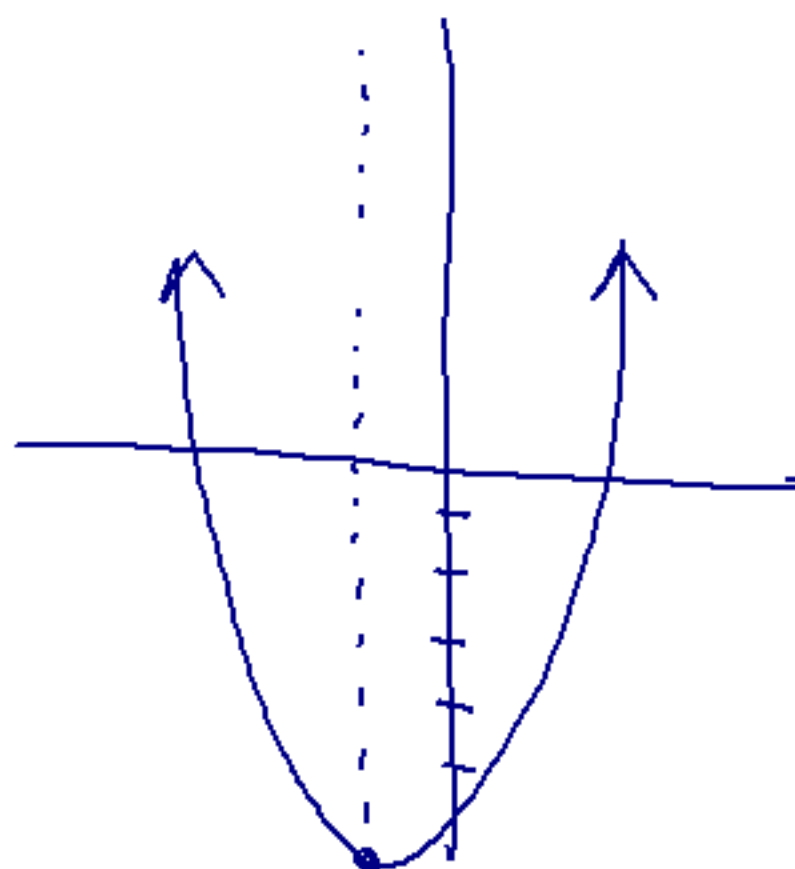


$$\textcircled{14} \quad y = x^2 + 5x - 6$$

$$x = \frac{-5}{2} = \textcircled{-\frac{5}{2}}$$

$$y = \left(-\frac{5}{2}\right)^2 + 5\left(-\frac{5}{2}\right) - 6$$

$$\begin{aligned} &(-2.5, -12.25) \\ &\left(-\frac{5}{2}, -\frac{49}{4}\right) \end{aligned}$$



$$\textcircled{15} y = -x^2 + 4x - 2$$

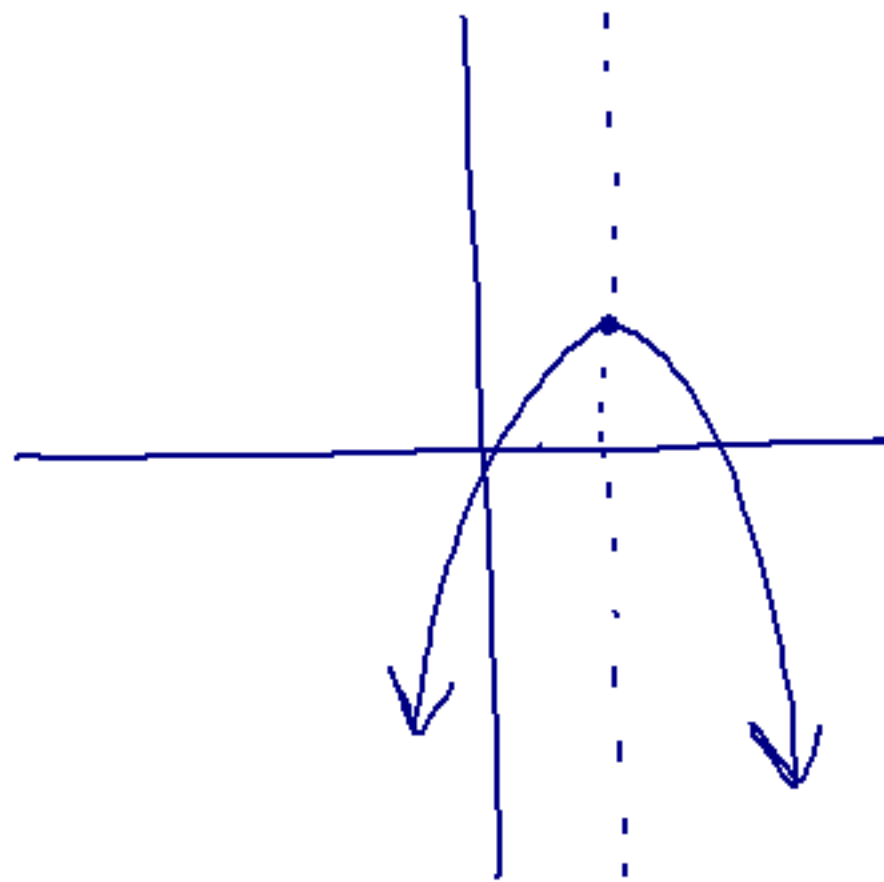
$$x = \frac{-4}{-2} = \textcircled{2}$$

$$y = -(2)^2 + 4(2) - 2$$

$$y = -4 + 8 - 2$$

$$\textcircled{y = 2}$$

$$(2, 2)$$



$$20) y = x^2 - 2x - 1$$

$$21) y = \underline{2}x^2 - 12x + 19$$

$$22) y = -x^2 + 4x - 2$$

